

# The American Museum Journal

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## THE OKAPI

BY J. A. ALLEN

*The American authority on mammals, Professor J. A. Allen, gives in the following an account of the okapi, of its discovery in 1901 when it was thought to be a relative of the horse, of the proof later in the same year that it is related to the giraffe and to certain extinct forms from the Miocene of southern Europe and of India. Although the okapi has been known for a space of ten years and is covered by a literature of more than half a hundred titles from the study of okapi skins and skeletons, the living animal, at least till recently, has never been seen in its native haunts by a white man and the realistic okapi group to be constructed in the American Museum as a result of the six months' work of the Museum's Congo Expedition in the Great Forest of Africa will prove a notable event in the scientific world.*

ON November 20, 1900, a letter was read at a meeting of the Zoölogical Society of London from Sir Harry Johnston, announcing that he had obtained evidence "of the existence of a very remarkable new horse," which appeared to inhabit the Great Congo Forest. At the Belgian post of Mbéni he found that this animal was called "okapi" by the Bambuba natives of the region, and he was fortunate enough to obtain pieces of the skin that had been made into waist-belts and bandoliers. These pieces exhibited the stripes of the legs and hind quarters, and indicated an animal different from any known zebra or wild ass. These fragments were forwarded by Sir Harry to the Secretary of the Zoölogical Society and exhibited at a meeting of the Society held December 18, 1900. Thus was obtained the first definite knowledge of a horse-like animal marked with black and white stripes referred to by early Dutch and Portuguese writers as existing in the great forests of Central Africa.

At a meeting of the London Society held February 5, 1901, these fragments were shown and described by Dr. P. L. Selater as representing a new species of zebra, which he named after its discoverer, Sir Harry Johnston, *Equus johnstoni*, the reference of the species to *Equus* being tentative. At a meeting of the Zoölogical Society held three months later (May 7, 1901),

Dr. Sclater exhibited a water-color drawing of the animal made by Sir Harry Johnston from a fresh skin secured through the Belgian authorities of Fort Mbéni. From this drawing it became evident that the new animal was not a zebra, nor even a member of the family *Equidæ*, but a species allied to the giraffe. The drawing was published as Plate I of Volume II of the *Proceedings* of the Zoölogical Society for 1901. This skin and also two skulls, obtained by native soldiers of the Congo Free State near Fort Mbéni, were forwarded by Sir Harry to the British Museum, where they arrived June 17, 1901, and served as the basis of a paper presented by Professor E. Ray Lankester the following day at a meeting of the Zoölogical Society. From these specimens he was able to give the principal characters of this strange animal and discuss its relationships. He found it to represent a new genus, allied to the giraffe and also to certain extinct forms from the Miocene of southern Europe and India. He gave to the new genus the name *Okapia*.

This skin was mounted by Rowland Ward for the British Museum, where it was placed on exhibition in August, 1901 — the first example of the "mysterious okapi" installed for public exhibition. Colored drawings of the mounted specimen were immediately given wide publicity in various popular as well as scientific publications. The discovery of an animal so strange and striking naturally excited great interest, and the okapi was soon famous throughout the world.

Since 1901 numerous specimens of this animal have been taken in the Congo region, nearly all of them through the agency of the Belgian Government. They include not only skins and skulls of adults of both sexes and of various ages, but also a number of complete skeletons, representing altogether some thirty or more individuals. While much of this material has been retained for the museums of Belgium, many specimens have been presented, by direction of the late King Leopold II, to other European museums. Permission has also been generously granted to several private expeditions of other nationalities to enter the Congo Free State in pursuit of the okapi, but apparently they have met with little success, except in the case of the Alexander Gossling expedition, which secured skins, skulls and skeletons for the British Museum, and, as noted below, of the Lang-Chapin Congo Expedition of the American Museum.

The material thus acquired by European museums, notably that in the Museum at Tervueren, has furnished the basis for several important monographs of the species, and for a large number of minor papers, resulting in an okapi literature numbering more than half a hundred titles, so that the external and osteological characters and the affinities of few species are now better known than are those of the okapi.

In the character of limbs and length of neck the okapi differs little from the ordinary type of ruminant, as for example a deer or an antelope. Although it differs widely in external appearance from the giraffe which has elongated limbs and enormously lengthened cervical vertebræ, the structure of the skull and teeth show it to be a member of the giraffe family. It has also two small frontal horns, somewhat similar to those of the giraffe but less developed, differing in this respect from ordinary ruminants. The lips are not prehensile and its small eyes give the head somewhat the appearance of that of a deer. The colored plate of the okapi sufficiently indicates its general appearance in respect to form and peculiar coloration.

The okapi is said to live in pairs in the depths of the forest and to feed on the leaves of the undergrowth. Up to a recent date it was said that no white man had ever seen the living okapi in its native haunts, or was likely to, as it is extremely wary and shy, and nocturnal in its habits. The specimens taken have all been captured by the natives, who are said to be able sometimes to steal up to the animals and kill them with spears, but usually they take them in traps. Sir Harry Johnston, in an account of his trip to the Congo Forest for okapi, thus speaks of its haunts: "Provided with guides, we entered the awesome depths of the Congo Forest. For several days we searched for the okapi, but in vain. We were shown its supposed tracks by the natives. . . . The atmosphere of the forest was almost unbearably with its Turkish-bath heat, its reeking moisture, and its powerful smell of decaying, rotting vegetation. We seemed, in fact, to be transported back to Miocene times, to an age and a climate scarcely suitable for the modern type of real humanity. Severe attacks of fever prostrated not only the Europeans but all the black men of the party, and we were obliged to give up the search and return to the grass-lands with such fragments of the skin as I had been able to purchase from the natives."

It was on the borders of such a region that the members of the American Museum Congo Expedition, under the leadership of Herbert Lang and James Chapin, camped for nearly six months and were successful in obtaining specimens of the okapi and the necessary accessories for a large realistic group of these animals for this Museum. While the Congo Expedition is to be congratulated on the results of its laborious efforts, these were rendered possible only through the generous and hearty coöperation of the officials of the Congo Free State under most favorable instructions from the Belgian Government. All the specimens were trapped by the natives by means of nooses set in the "terrible swamps" of the Great Congo Forest.



Seen near at hand the poles are grotesque, some of them still exhibiting, even after the many years of exposure to wind and weather, faint traces of the color with which they were originally painted. Totem poles mark the area of the North Pacific Coast culture, which extends from Puget Sound to the Eskimo country in southern Alaska. These Bella Coola totem poles are now in the American Museum. (The Indians would not sell the carved human figures on top)

## TOTEM\_POLES OF THE NORTH PACIFIC COAST

HUGE CEDAR CARVINGS OFTEN SO OLD THAT THE INDIANS THEMSELVES HAVE FORGOTTEN THEIR MEANINGS. EACH TOTEM POLE TELLS SOME ANCESTRAL LEGEND OR IS THE "BADGE" OF A FAMILY OR CLAN

*By Harlan I. Smith*

Photographs by the Author

IN some villages of the North Pacific Coast of America a totem pole stands in front of each house and the houses stand in a row facing the sea. From a distance the poles look like stubs of a dead forest fringing the edge of the sea and not till one approaches nearer do the squatty houses appear nestled in the vegetation just back of them. When seen near at hand the poles are grotesque, some of them still exhibiting, even after the many years of exposure to wind and weather, faint traces of the color with which they were originally painted.

Totem poles are a conspicuous feature of any village on the North Pacific Coast of America, so conspicuous indeed that the Indian tribes living here have sometimes been called "Totem Pole Indians." The poles mark the area of the North Pacific Coast culture, which extends from the vicinity of Puget Sound along the coast to the Eskimo country in southern Alaska. The influence of this culture, to be sure, extends southward along the coast but at Puget Sound it begins to lose its strongest characteristics. Indications of its influence are found also in the interior especially along the water-ways. Some of the best totem poles are not seen by the tourist who makes the delightful scenic trip to Alaska by way of the calm inland



TAMANAWAS BOARD, BAY CENTER  
WASHINGTON

This crude carving, now in the possession of the Museum, shows totem pole influence south of the North Pacific Coast culture area

passage, but are to be found in remote villages far up some of the mighty rivers of the North Pacific Coast.

Totem poles are carved from cedar. On this rainy foggy coast which is never very hot in summer nor bitter cold in winter, the forests are noted for their gigantic cedars. The Indians here are preëminently a woodworking people; they have become clever in the arts of splitting, bending, splicing, carving and inlaying. The house is made from split cedar planks on a framework of adzed cedar logs. The canoe is dug out of a huge cedar trunk. Much of the clothing is made by weaving shredded cedar bark. Spear handles are whittled out of cedar wood while the masks used in the ceremonies are also often carved from cedar.

The carvings on the poles most often represent animals, among those commonly shown being the beaver, bear, raven, frog, finback whale and squid. Mythical monsters are also represented, while the human face and figure are common. Sometimes the carved figure of a man forms the top



THE TOTEM POLES STAND IN A ROW FACING THE SEA  
Skidegate, Queen Charlotte Islands



of a totem pole to represent the speaker or orator employed by an Indian host giving a banquet or by a financier making an investment somewhat as we have a lawyer represent us at court. Some of these are hollow figures in which a slave or servant may be secreted to make speeches through the open mouth. Frequently such a figure is carved standing upon the head of another carved figure representing a slave, tending to show that the owner of the house was rich in slaves.

The art of the average totem pole is on the whole symbolic and conventional though rather realistic in appearance. This is true not only in the case of the totem poles but also in nearly all of the art of the Northwest Coast peoples. On the other hand, the same motifs, animal and human, may be employed for purely decorative purposes and some of the baskets and occasionally blankets show geometric designs, many of which, however, probably symbolize ideas also, while decorative carvings without symbolic meaning may be inserted here and there on a totem pole to fill up blank spaces between the symbolic carvings. One method of conventionalizing a carving frequently consists in exaggerating some salient feature of the animal represented; for instance the carvings of a beaver and a wolf look very much alike except that the beaver is indicated by prominent incisors and a flat tail. Again, the artist has sometimes distorted to fit the field what would otherwise have been a nearly realistic figure or a slightly conventionalized one. It must not be forgotten that among Indians as among other peoples great artists are rare, and that men of wealth who desire to have a fine totem pole must pay enormous prices in such things as blankets, canoes or slaves in order to have the most perfect work.

Carved house and grave posts are akin to totem poles. On entering the houses we find that some of the posts supporting the rafters are carved so much like totem poles that where a house has gone to decay and only the posts remain, they may quite naturally be mistaken for small totem poles. Sometimes the house posts are plain, and carved posts which do not bear any



Tlingit modern totem pole at Wrangel, Alaska, contrasting sharply in idea with a mission church near. The lowest carving is a beaver as shown by the teeth and tail

Before the  
Chief's house,  
Wrangel



Looking out  
to sea at Old  
Wrangel



part of the weight of the frame are placed against them. Again if one pushes through the nettles and salmon-berry bushes to the graveyard, he will find there many carved posts which may be mistaken for little totem poles.

There is another object which when removed from its proper position resembles the totem pole: this is the carved "grease trough." It is supported like the ridgepole of a house in such a position that it hangs above the fire, a magnificent chandelier, and the grease with which it is filled runs out of the giant carved mouth and falling upon the fire causes it to blaze up and illuminate the surroundings — probably at the festivities of some great banquet to the honor of the host and his family.

The style of the totem pole and of other carved posts varies more or less from tribe to tribe. Grave posts and house posts among the Salish tribes of Puget Sound are rather flat bas-reliefs and there are few, if any, tall totem poles. Among the Haida the totem poles are tall, massive, carved in the round and of excellent workmanship. Totem poles are rare among the Nootka and though this tribe makes many small figures of wood, these are not of excellent workmanship. At Victoria I found a Nootka Indian carving a large totem pole and learned that he was copying to order from a photograph a Haida pole for a curio dealer. The curio dealer informed me that he intended to put this on the roof until it was weathered enough to resemble an old pole. Sepulchres are made in some totem poles, notably among the Haida and Tlingit. There are several poles of this type at Wrangel. Such totem poles have at the back some distance from the ground a niche in which the body is placed.

The complete significance of a totem pole



is not always clear to-day even to the Indians themselves because the original meaning of the carvings and paintings has in many cases been forgotten. Also, although some of the most competent American anthropologists have seen and described these poles of the North Pacific Coast, the interpretations they have given of them have only too often been avowedly incomplete. Probably on some of the poles the carved figures illustrate a legendary dream or exploit of the ancestor of a family or clan. This legend is, then, the property of the family and together with the family dance and song is often believed to have been obtained by the ancestor from the totem animal. Thus the totem animal has come to be regarded as the "badge" of the family or clan, somewhat as the eagle is the symbol of the United States. Although the totem animal does frequently figure as the guardian of the family or clan, these animals must be sharply differentiated from the guardian spirits of the eastern Indians, in so far as the totem animals have come into relation to the family through the ancestors of the groups and not through any living individuals belonging to the group. Property sentiment has become strongly associated with the poles and the ideas the poles stand for so that no two families can be found claiming identical totem poles. Often the meaning of any given pole has become very complex because marriages and important family events, such as great potlatches or the killing of slaves in order to show the great wealth of their owner may have been inserted on the pole in carvings additional to those representing the traditional legend.

It has been found difficult to get totem poles for the Museum. In the first place they



Overgrown  
with grasses  
and vines, Old  
Wrangel



Primitive  
art at Old  
Wrangel

House post from Comox, British Columbia, now in the American Museum. Speaker represented as standing on the head of a slave



are seldom if ever owned by an individual but rather by a family or group and it is as difficult to close a deal with them all as to get a quit claim deed from all the heirs of an estate. The second reason for the difficulty in getting possession of totem poles is that the Indians who still retain their regard for old customs and institutions will not think of parting with one of these symbols of aristocracy, which is also interwoven with their religious ideas. If, on the other hand, the Museum representative goes to the Indians who have been under the influence of missionaries and Government teachers, he finds that they have no totem poles, for almost as fast as the Indian loses his regard for the totem poles he is willing to chop them up and burn them. He is often urged to do so by the missionaries who desire to remove every reminder of the old life, believing that the Indian will then quickly adjust himself to the new ways taught by the white men.

Notwithstanding the difficulty in getting possession of totem poles, the American Museum is relatively rich in these primitive carvings, the Haida and Kwakiutl being best represented, the Tlingit and Tsimpshian least satisfactorily. Altogether there are some fifty specimens in the Museum's collection which for the most part is on exhibition in the North Pacific Hall.



Carved house post, Bella Bella

## A GIFT FROM ECUADOR

*By Charles W. Mead*

THE collection presented recently to the Museum by Mr. D. C. Stapleton contains two stone seats found near the Port of Manta, Province of Manabi, Ecuador. Such stone seats have been discovered in great numbers on the summits of Cerro de Hojas, Cerro Jaboncillo, Cerro Jupa and Cerro Agua Nuevo and form the most remarkable feature of the archaeology of Manabi, nothing resembling them being known from any other part of the Americas.

The specimens in the various museums of Europe and America have come for the most part from Cerro de Hojas, found in prehistoric house sites. All of these seats appear to have been carved from andersite or from argillaceous shaly sandstone—the two presented by Mr. Stapleton are of the latter—and all may be described as U-shaped, although



there is considerable variety in their width and in the curve of the sides. Usually the crouching figure supporting the seat represents a man or a puma, but bird, lizard, bat and monkey-like forms also occur and some specimens have been found in which the supports and bases are without figures.

In addition to the stone seats from Manabi, Mr. Stapleton's gift to the Museum includes some thirty specimens from the Province of Esmeraldas, about one-half of which were excavated from prehistoric burial mounds, the balance coming from the Cayapa Indians who inhabit the province to-day.

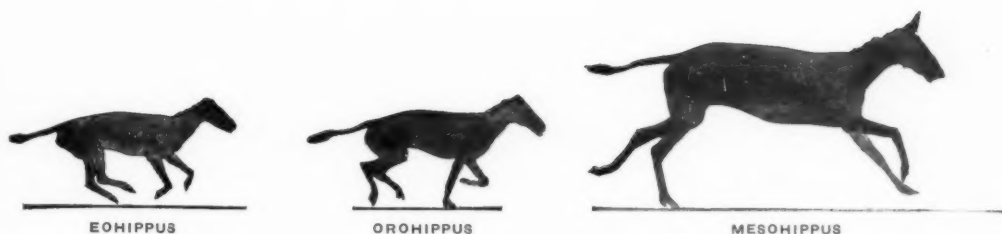
Of the archaeological part of the collection, second to the stone seats in interest are the pottery stamps as showing the status of the ornamental art of this unknown people. In all probability these stamps were used to ornament cotton and bark cloth.



EXCAVATING THE SKELETON OF THE FOUR-TOED HORSE

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This skeleton was found in the bad lands south of the Gray Bull River, Big Horn Basin, Wyoming. It was imbedded in a stratum of gray shale and was brought to the notice of the prospector by a few fragments of the hind limbs which had weathered out and lay on the slope of the knoll



### A NEW SPECIMEN OF THE FOUR-TOED HORSE

EARLIEST KNOWN ANCESTOR OF THE MODERN HORSE, THE SMALL FOUR-TOED EOHIPPUS, DISCOVERED IN THE BADLANDS OF WYOMING

*By Walter Granger*

THE continent of North America has produced the most complete and best preserved fossil remains of the horse; and it chances that of all institutions, the American Museum possesses the finest collection of fossil horses. Aside from fragmentary material, there are eight mounted skeletons in the Hall of Fossils, covering a remarkable series of connecting links from the little four-toed *Eohippus* of the early Eocene to the large, modernized, one-toed *Equus* of the Pleistocene or Glacial Period, at which time the horse became extinct in North America.

The skeleton of *Eohippus* at present mounted in the Museum is of the most advanced species of that genus and is from the Wind River formation of Wyoming. It was of especial interest therefore, when the expedition of the Department of Vertebrate Palæontology sent to Wyoming the past summer, discovered a nearly complete skeleton of one of the most primitive species of *Eohippus*, previously known to science merely by fragments of jaws containing the teeth. This was found in the extreme northwestern corner of Wyoming, in the Wasatch formation of the Big Horn Basin.

After the close of the great Age of Reptiles, at a time roughly estimated at 3,000,000 years ago when the region was at sea level, there occurred an uplifting of mountain ranges and a general elevation of the country. The Big Horn Basin was one of several formed by this raising of mountain chains, and into the basin ran the sediment washed from the rocks of the higher surrounding regions. Here in a moist, warm climate and probably with an abundance of vegetation, many primitive mammals including the little *Eohippus* lived and died, and their bones became buried in the slowly accumulating clays and sands, and eventually petrified. Approximately these conditions existed until there had been deposited in this Basin a great mass of sediment 2,000 feet thick; the Basin was nearly filled and a drain-

age outlet to the north into the Missouri River was formed. Then conditions changed, the process of deposition ceased, and that of erosion began and has continued to the present time. To-day the Big Horn Basin is 4,000 feet above sea level in its lowest parts, it is arid, in fact almost barren except along the few water courses which lead down from the mountains, and the erosion has removed the greater part of the original 2,000 feet of sandstone and clay. A few high, flat-topped buttes, left by the erosion, indicate the level of the Basin at the time when the erosion began, but for the most part the formation has been worn down nearly to its base, and the country presents great areas of low, rounded knolls and sharp, steep ridges comprised chiefly of gray and red hard, brittle clays with occasional layers of sandstone, and often absolutely bare of any vegetation. Such areas are known to the geologist as "bad lands," and it is here that the fossil collector makes his search for the petrified remains of these ancient animals. As the hills are slowly worn away by the heavy spring rains or an occasional cloud-burst in summer, the bones which have been entombed for so long can be detected by the trained eye of the prospector. Often it is merely a worthless fragment of bone, sometimes a fragment of jaw or a skull, and in rare cases a nearly complete skeleton such as the present one. In such instances it is probable that the body of the animal became buried soon after its death, before the bones could be scattered by carrion eaters or by the action of water or other agents.

The present skeleton was found by Mr. William Stein, who has been employed as cook and teamster of the Wyoming expeditions for several seasons and who spends his spare time in searching the bad lands, with the rest of the party. The finding of fossils is largely a matter of keen eyesight, of a certain amount of training in knowing what to look for, and of ability to spend long days walking or slowly riding through the broiling heat of the bad lands. It was the bleached fragments of the bones of the hind legs which attracted the attention of the collector as they lay on the sloping surface of a knoll. These surface fragments were carefully gathered up, and a little careful prospecting showed the hip and backbone of the animal extending into the solid clay of which the knoll is composed. By removing the overlying rock the whole upper part of the skeleton was exposed as it lay on its side in a horizontal position. Instead of removing the bones one by one from the rock, the whole skeleton was taken out, with such of the encasing rock as was necessary, the entire mass being bound up, as is usual in collecting such specimens, in heavy bandages of burlap and paste.

In the laboratory the bandages will be removed, and the slow, rather tedious task of removing the small and extremely fragile bones from the rock will begin. It took three days to excavate the specimen in the field,





One of the Expedition's "Dry Camps" in the heart of the fossil fields south of the Gray Bull River. Dr. Sinclair and Mr. Olsen, two members of the expedition, worked for more than a month from these dry camps, which were supplied periodically with water and provisions from the main camp on the river.



Prospecting in Wind River Basin, Wyoming. Much of the preliminary prospecting and the geological reconnaissance work is done on horseback but the actual search for small fossils must be done afoot.



*Eohippus*, the four-toed horse. Restoration by Charles R. Knight. The animals were scarcely larger than the red fox

but it will probably require three weeks to free the bones from the matrix, before the mounting of the skeleton for exhibition can be commenced.

As the work of clearing the rock progresses, one point of anatomy will be keenly watched, and that is, whether this earliest known horse possesses the remnant of a fifth toe on the front foot and of the fourth toe on the hind foot. If it does, this places it a decided step nearer to the still earlier but yet undiscovered ancestor of the horse, which undoubtedly possessed five toes on both fore and hind feet.



## PRESERVATION OF MAMMAL SKINS IN THE FIELD

*By James L. Clark*

[Mr. James L. Clark was at one time animal sculptor in the American Museum and has recently spent fourteen months on a hunting trip in Africa. His account of the practical field work necessary for the preservation of the skins of large animals will be followed by an account of the task of the animal sculptor in the Museum who builds on the work done in the field in Africa to make these animals "live" for the people of another continent in the American institution's exhibition halls.— Editor]

FROM the point of view of the majority of visitors to the Museum, who see mounted and often wonderfully lifelike animals exhibited there, it is unlikely that the initial labor, and in a large number of cases the perils encountered in securing the material for the finished work, are at all considered. They probably go no deeper into the matter than that the rhino, for instance, was killed in Africa, transported overseas and set up for public instruction. But the actual work and how it is accomplished by the collector in the field, the endurance of hardships, the skill and perseverance necessary in the pursuit of specimens, is little known.

In making a collection the work in the field must often be carried on under the most unfavorable conditions. In the case of a large animal, for example, this work must be done just where the kill is made, whether in a swamp, on a rocky ledge or a sun-scorched plain. Under the most trying circumstances the collector's one anxiety and aim must be as always for perfect results, and he must gather all data, field notes and measurements, sketches and photographs that will add to a fuller knowledge of the animal and thus assist in its restoration later by the taxidermist.

Perhaps the Museum has planned a group of animals and has decided what particular species shall be displayed. The collector is then sent into



*Photograph by Kermit Roosevelt*  
Copyright by Charles Scribner's Sons

Native boy carrying in a leopard shot by Kermit Roosevelt<sup>1</sup>

<sup>1</sup> This photograph and the one on page 93 together with the photographs of white rhinos and elephants in the January JOURNAL are from Colonel Roosevelt's *African Game Trails* and are used through the courtesy of the author and publishers of that book.



*Photograph by James L. Clark*

The taxidermist's work of measuring and skinning the hippo must usually be done in the water. Kisii boys are waiting to get the meat, which they consider the best of all African game because it has a large amount of delicious fat

the field to gather the necessary material. He it is who picks from the herd the specimens which will best show the physical differences at varying ages, or in the case of horned animals, it may be a series of males which will illustrate the growth of the horns from the young spikehorn to the matured and typical horn or antler.

After the selected specimen has fallen to the rifle, photographic records must be made, for they prove most valuable to the taxidermist, not only in showing the animal in full but also in furnishing important details of both front and side views. If possible a plaster cast of the face or entire head is made. Careful description is essential as to the color of the eyes, eyelids and nostrils or any fleshy portion which may undergo a change when the skin is dried, and exact measurements of the body and limbs are recorded.

Great difficulty is frequently encountered when collecting hippos, for

they are often shot while they are in deep water, where they may sink to the bottom or float down stream. Because of this many fine specimens have been lost. The surest way is to surprise and shoot them on shore, if possible. This must be done at night however, as during the day they readily scent approaching danger and rarely leave the water. The best method therefore in shooting the hippo is to plan the work at a point where the carcass if it drifts down stream, will lodge in the shallows or on a sand bar. Then the "boys" (natives) gather about and roll it as near the shore as possible. But even then it is likely that all the measuring and cutting up must be done in the water.

After careful taking of notes and measurements, the carcass is skinned. The African natives, and especially those of the Wakamba tribe, are very skillful with the knife and are of great assistance in this work. One boy, in particular, could take a specimen as large as a zebra, skin it perfectly, with the legs "round" (that is, not cut), salt, dry and fold it for carrying.

Not a scrap of flesh goes to waste as the natives are decidedly carnivorous. If several animals have been killed all the meat is carried to camp, and after the choicest parts have



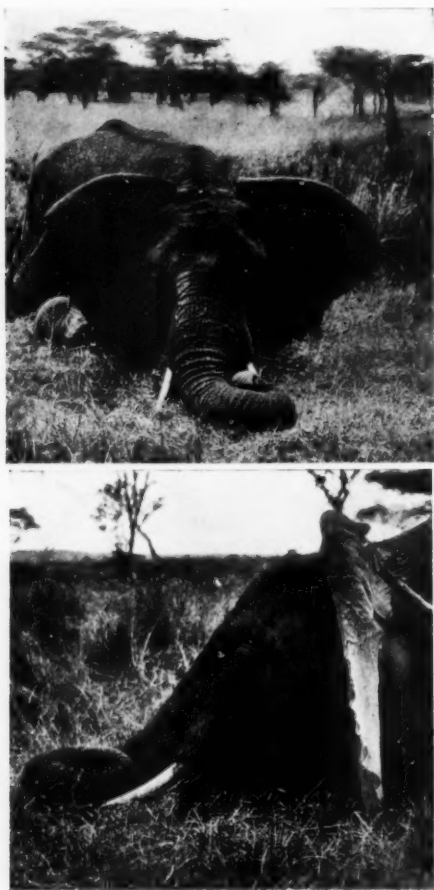
*Photograph by James L. Clark*

Giraffe (female) of the five-horned variety. Photographs and color studies are made for use in the later mounting of the skin.



*Photograph by James L. Clark*

Impalla, considered by many the most beautiful buck in British East Africa



*Photographs by James L. Clark*

Head studies of a female elephant on the Guasha Ngisu Plateau. This elephant, accompanied by its young, charged Mr. Akeley and Mr. Clark and had to be killed when it reached some thirty-five yards distance

been laid aside for the collector and his party, the rest is given to the boys, who, after eating all they possibly can, dry what is left and later, when on the march, trade portions of it for milk, honey and potatoes.

For the preservation of skins nothing can surpass common table salt. This is not only a preservative but it also draws out so much water that the salt is dissolved and the skin dries rapidly. By leaving the skin rolled up for some hours after treatment, the salt is absorbed into the tissues and remains there after the drying out. Decomposition must be carefully guarded against until after a skin is once dried, when the danger is very slight. Even with a salted skin which cannot be opened flat, there is the possibility of its "sweating" in the folds during drying. These places therefore must be closely watched and the skin turned about to allow the air to reach them. If facilities are at hand, the best

results are obtained by placing the skin in brine after it has been left rolled up in salt for several hours; the skin will be kept not only soft but as well protected from the ravages of destroying insects as though placed in cold storage.

Forced drying, near a fire or in the strong sun, is a method treacherous in its results, but may be successful if great care is taken that the skin is not allowed to become too hot. The method of drying without the aid of



salt or other preservative is sometimes necessary. With this method of drying, the skin must be pegged or stretched out perfectly flat, although such pegs or ropes often cause ugly holes or distort the skin so that there is difficulty in restoring it to its natural shape. In the case of a valuable specimen when no other means are available, this method is better than none.

Salt is a great aid in softening the skin when finally to be prepared for mounting. That which has remained in the tissues readily absorbs the water in which the skin is put to soften and the time thus consumed in the process is very short. With a sun-dried skin, on the other hand, it will sometimes be days before the heavier parts are thoroughly soaked, and meanwhile the thinner portions must also remain wet and run the danger of the decomposition which will cause the hair or epidermis to "slip." It would naturally be supposed that dried skins could be softened in salted water, which would at the same time act as a preservative. This, however, is not the case. A skin will soften only in fresh water.



*Photograph by Kermit Roosevelt*

Copyright by Charles Scribner's Sons

Group of skin-laden mules passing by the Bondoni waterhole on the way to the railroad

To preserve heavy skins successfully, like those of the rhino, hippo and elephant, which may be one and one-half inches thick at certain points, it is imperative that they be salted immediately upon removal, and after that they should at once be cut or shaved down on the flesh side to about half an inch in thickness. Then fine salt, generously applied, will penetrate through the tissues to the epidermis or base of the outer skin, preserving it and holding the hair tightly in place. As this outer skin is a natural waterproof covering to the animal, it does not absorb readily and all treatment must be applied to the flesh side. Powdered alum may be used locally, but only when absolutely necessary, as it hardens the tissues to such an extent that no "life" or elasticity returns when the skin is finally prepared for mounting.

Climate plays an important part in the successful preparation of skins and for this reason the dry, tropical atmospheric conditions of Africa are ideal. The power of the sun is tempered by a morning and evening breeze, not only grateful to human beings, but also very useful in rapid drying. For example, a zebra skin if hung up in the early morning will be dry by nightfall. During the rainy season — from about the middle of March to the middle of June and again in the month of November — drying is more difficult, owing, of course, to the amount of moisture in the air. But nearly every day during this season there is a brief period of warm sunshine so that a salted skin may even then be properly dried.

The preservation of the skeleton, particularly the bones of the legs, shoulderblades and pelvis, in addition to the skull, is of the greatest importance as they are necessary later in the proper mounting of a specimen, since the taxidermist must set them up in their proper position and model with clay the correct anatomy of the muscles about them.

The method of transporting the accumulated specimens in the field in Africa is of necessity a primitive and often a difficult one. The entire outfit is made up into sixty-pound loads and carried on the heads of the natives, unless some load prove too heavy for one in which case it is carried, likewise, on a pole between two bearers. When the amount of material to be transported becomes very large a base camp is established, and the specimens stored there in the care of two or more porters, until such time as the trophies can be sent to a railroad station and shipped as direct as may be to the Museum.

## FLEA CARRIERS OF THE PLAGUE

THE PLAGUE GERM IN MAN IS IDENTICAL WITH THAT IN THE RAT AND  
FLEAS MAY CARRY THE GERM TO MAN

*By Frank E. Lutz*

SCIENCE was late in discovering and the world in accepting the knowledge that insects may be common carriers of disease. In fact it is not so very many years since science isolated the minute germs themselves for identification in such cases as typhoid, malaria, yellow fever and plague. To-day flies and mosquitoes stand convicted the world over as carriers of disease germs and the warfare against them is well on. In this case there are three factors concerned in the battle and man conquers the germ by exterminating the insect.

Fleas as disease carriers have been conspicuously before the world of late; they also stand convicted, but the question concerns the interrelationship of four: man, the flea as carrier, the rat or other animal on which the flea is parasitic and the disease germ. Again warfare is against the insect but to be successful it must be directed with full force against the rat, its host. Would that in all instances the whole trio — rat, flea and germ —

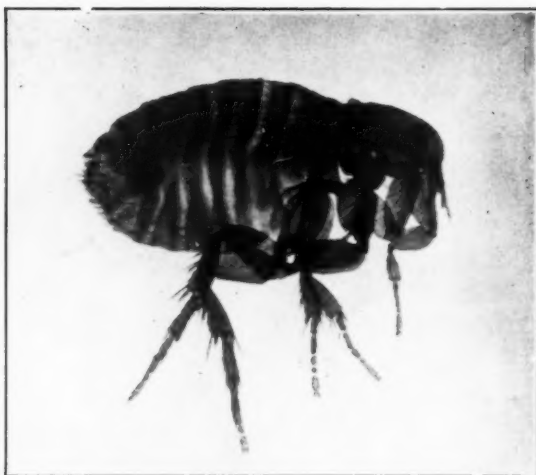
Head of rat  
flea. Many  
plague germs  
may be carried  
on the mouth  
parts of a flea



and 5000 or  
more in the  
stomach where  
they will live  
for 15 to 20  
days

*Photomicrograph<sup>1</sup>*

<sup>1</sup> Flea illustrations from Doane's *Insects and Disease* by courtesy of Henry Holt and Company. Other cuts by courtesy of McClure's and *Country Life in America*



Human flea, *Pulex irritans*, found in all parts of the inhabited globe. Occasionally occurs on cat and dog, rats and mice

could be put out of existence as easily as they are said to have been on incoming ocean liners in San Francisco harbor. These vessels are nearly gas-tight and two tons of sulphur were used to fill up and fumigate each one for five hours, after which it is reported that fifteen to twenty buckets of dead rats were removed.

The heavy ravages of plague now raging in parts of the Chinese and Russian empires, where little has been done to strike at the acknowledged purveyor of the disease, stand strongly contrasted with the very small loss of life from the recent outbreak in San Francisco. That the



The rat flea, *Lamprosylla cheopis*, is the "plague flea" but the human flea and the cat and dog flea live on the rat also and thus may carry plague germs as well

plague reappeared in all parts of that city in 1907 after having been stamped out in Chinatown in 1900 was probably due to the scattering of the city's rats during the earthquake and fire. Energy was directed at once however toward the extermination of the rats, fully one million were killed, and as a result the plague was checked.

It is known now that an outbreak of plague is always preceded by a similar scourge among rats, because bubonic plague is primarily a rat disease. Yet so blind has the world been to the interrelations of animals and man in cases of infectious disease that notwithstanding the terrible inroads made by the "black death" in various parts of the world during historic times, no report is made prior to 1800 of the coincident inroad upon rats. It was in 1894 that Yersin of the Pasteur Institute isolated the bubonic plague bacillus (*Bacillus pestis*) and proved the germ to be the same in rats and man. But this was only a few years ago. Knowledge came late. Bubonic plague had well-nigh encircled the globe before this, breaking out first in seaboard places probably having travelled from country to country among ship rats. The effect of this discovery which turned the attack upon the rat is shown well in Bombay where the death rate of 20,788 in 1903 was reduced to 5,197 in 1909.

As yet the rats of the northeastern United States are not plague infected, but this is not necessarily a permanent condition. There may be at any time in New York or other eastern seaport an outbreak of plague such as occurred in Suffolk, England, last September. For plague is not limited to the tropics or semi-tropics although it has flourished there because of less sanitary conditions. Fleas are common in the eastern states. Inquiries concerning them reach the Museum at all seasons of the year, but



Washing his face and scratching his ear in rat contentment. The brown or "Norway" rat, *Mus decumanus*, which has today colonized well nigh the whole earth driving to the wall the black rat, *Mus rattus*, the species of romance and history. He is more "sinned against than sinning" in the plague matter for bubonic plague is a rat disease, in any given outbreak the rat mortality being to human mortality as ten to one

especially in the fall after houses which have been closed during the summer are reopened. Larval fleas have uninterrupted opportunity during the summer to develop into adults which sometimes make a house literally uninhabitable. Fleas are considered degenerate members of the Diptera, the order to which flies and mosquitoes belong, and they are wingless, winglessness often accompanying the parasitic state, perhaps through disuse of these organs. That the flea lacks wings may make the spread of plague less rapid; the lack of flight powers, however, is counteracted by the fact that fleas are carried long distances by their hosts.

In the East, practically the only flea that gains access to the house is the cat and dog flea (*Ctenocephalus canis*), the human flea (*Pulex irritans*) being rare. Measures for ridding a house of fleas must plan to attack not only the adults but also the eggs and larvæ. These are likely to be in the dust of the animal's bed and in cracks and crevices about the house and furniture. The remedy lies in making it impossible for the eggs to develop and the larvæ to live in these places, in providing for the cat and dog sleeping places that can be kept clean with all dust removed and burned. A liberal use of pyrethrum powder should be made in all places where it is possible that flea eggs may have fallen. Kerosene or benzine are valuable if milder means do not suffice while in extreme cases fumigation with hydrocyanic acid may be necessary.

The rat flea (*Læmopsylla cheopis*) is known as the "plague flea," but both the human flea and the cat and dog flea also live on the rat so that any one of these may act as a carrier of the plague germ if they chance to travel from a plague-infected rat.

It has developed through a few deaths in California directly traceable to handling ground squirrels that here too danger lies, that the plague bacilli have reached these rodents probably from rats which use the squirrels' holes in fields. The discovery may mean the necessity of extermination of the squirrels in infected regions.





## ANNUAL MEETING OF THE BOARD OF TRUSTEES

THE Forty-second Annual Meeting of the Trustees of the American Museum of Natural History was held on Monday, February 13, 1911, at the residence of the late William E. Dodge, where the Trustees were the guests of Mr. Cleveland H. Dodge. The following were elected officers for the ensuing year: President, Henry Fairfield Osborn; First Vice-President, Cleveland H. Dodge; Second Vice-President, J. Pierpont Morgan, Jr.; Treasurer, Charles Lanier; Secretary, Archer M. Huntington.

Dr. Walter E. James and Mr. Madison Grant of the Zoölogical Society were elected as new members of the Board to fill vacancies in the Classes of 1915 and 1912 respectively.

Resolutions were adopted with reference to Mr. J. Hampden Robb, Secretary, who died January 21 after a brief illness. For more than twenty-five years Mr. Robb has been an active member of the Board of Trustees of the American Museum.

Dr. Charles H. Townsend was appointed to continue in the administrative office of Acting Director, with the understanding that he will return later to the direction of the New York Aquarium, and Mr. George H. Sherwood was reappointed Assistant Secretary. The United States Trust Company was made Assistant Treasurer.

The scientific staff for the year 1911 was approved, involving the following promotions and appointments —

Department of Vertebrate Palæontology: Dr. W. D. Matthew, from Acting Curator to Curator; Mr. Barnum Brown from Assistant Curator to Associate Curator of Fossil Reptiles; Mr. Walter Granger from Assistant Curator to Associate Curator of Fossil Mammals;

Department of Mammalogy and Ornithology: Mr. Roy C. Andrews from Assistant in Mammalogy to Assistant Curator of Mammalogy; Mr. W. DeW. Miller from Assistant in Ornithology to Assistant Curator of Ornithology;

Department of Public Health: Mr. John Henry O'Neill, Assistant;

Department of Ichthyology and Herpetology: Professor Bashford Dean of Columbia University, Curator.

The expenditures for the past year were reported as follows:

By the City . . . . .	\$185,757.00
By the Trustees, General and Special Funds . . . . .	207,435.85
Grand Total . . . . .	\$393,192.85

For the coming year the two African expeditions at present in the field will be continued, the one under Mr. Carl Akeley in British East Africa

and the other under Messrs. Lang and Chapin in the Congo; also the Stefánsson-Anderson Expedition along the Arctic borders of British America will be maintained. New expeditions are projected in the West Indies, in Colombia and Venezuela. Another whaling expedition will be sent to the coast of Japan in November. Altogether \$62,906.63 has already been subscribed or pledged toward the exploration work of the Museum during the coming year in various parts of the world.

### EXPEDITION TO LOWER CALIFORNIA

THROUGH a fortunate coöperation between the American Museum of Natural History and the United States Bureau of Fisheries, the large government steamer Albatross sailed from San Diego, February 25, on a two months' collecting expedition to Lower California. Dr. Charles H. Townsend, Acting Director of the Museum, is in command of the expedition. He is well acquainted with the region, having previously made several zoölogical and fishery trips in this part of the Pacific; also he knows well the work of the steamer Albatross, since he was the naturalist of the vessel on several voyages, and even participated in this vessel's deep-sea investigations under the late Professor Agassiz.

Dr. Townsend is accompanied by seven investigators and collectors, certain of them representing the United States National Museum at Washington, the New York Zoölogical Society and the New York Botanical Gardens all of which bear a share of the burden of the expense of the trip and participate in the collecting.

Dr. Townsend will begin the work with a line of deep-sea dredgings to Guadalupe Island some two hundred and fifty miles from San Diego. The dredging will extend even to depths of two and one-half miles. Mr. G. C. Bell of the preparation department of the American Museum is a member of the staff of the expedition and will make molds of the various deep-sea fishes and invertebrates as soon as they are collected. Deep-sea species have previously been known by the public only in the form of unattractive alcoholic material and if successful plaster and glue molds can be obtained and lifelike casts made, the triumph will be great for the preparator's skill and a work will be done that has never before been attempted.

From Guadalupe Island the Albatross will work eastward to begin a fishery survey of the Peninsula of Lower California. The fishery resources of the region will be studied with a view to the establishment of closer fishery relations with Mexico, and if possible, to opening the way for fishery trade and the utilization of the important fish and oyster resources in our

southwestern states. It may even be possible that the pearl shell from an important pearl shell industry of this region can be transplanted to Florida.

There will be work on shore also. The Peninsula is seven hundred and fifty miles long and will be studied along both coasts. During the progress of the vessel along these coasts collecting parties will be landed each day to procure the mammals, birds, reptiles and fishes of the region, which are of especial interest to naturalists because so large a number of them are peculiar to the locality. Altogether, it is expected that the work of the expedition will bring large results along fishery, oceanographic and biological lines.

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#### MUSEUM NEWS NOTES

SINCE our last issue the following persons have been elected to membership in the Museum:

*Benefactors*, MR. J. PIERPONT MORGAN and MRS. MORRIS K. JESUP;

*Patrons*, MR. ANDREW CARNEGIE and MRS. EDWARD H. HARRIMAN;

*Life Members*, MESSRS. WILLIAM GOULD BROKAW, F. AMBROSE CLARK, MICHAEL JENKINS, JOHN ROGERS, PHILIP A. ROLLINS, WALTER WINANS, MRS. MARIAN VON R. PHELPS, MISS FRANCES VON R. PHELPS and MASTER PHELPS VON R. PHELPS;

*Sustaining Member*, MISS SUSAN D. GRIFFITH;

*Annual Members*, MESSRS. E. B. CROWELL, GHERARDI DAVIS, J. WILLIAM GREENWOOD, TOWNSEND JONES, T. W. LAMONT, NICOLL LUDLOW, FRANK J. MUHLFELD, JOSEPH H. SPAFFORD, EDWARD W. SPARROW, EDWARDS SPENCER, CHARLES H. WERNER, DRs. CHARLES REMSEN and ARTHUR L. HOLLAND, MMES. THEO. B. BLEECKER, CHARLES S. FAIRCHILD, RUSSELL WELLMAN MOORE and PAYNE WHITNEY.

DR. J. A. ALLEN was appointed Acting Director pro tem at a Special Meeting of the Executive Committee, February 20, 1911, for the period of Dr. Townsend's absence on the Albatross expedition to Lower California.

IN its meeting of January 18, 1911, the Executive Committee of the Board of Trustees approved the following Appointive Committee on Public Health named by President Osborn: Dr. Simon Flexner, Mr. John M. Glenn, Mr. J. Waldo Smith.

THE following persons have contributed to the South American Bird Fund and have been made Life Members of the Museum in recognition of their gifts: Messrs. George B. Case, Evans M. Evans, W. F. Patterson, George P. Shiras and F. C. Walcott.

At the Special Meeting of the Executive Committee on February 20, 1911, Mr. John A. Grossbeck was appointed Assistant in Invertebrate Zoölogy.

MR. ALBERT OPERTI, official artist of the Peary Expeditions of 1896 and 1897, has presented to the Museum twenty-four sketches in oil, showing the excavation of the great meteorite "Ahnighito" and its transfer to the ship ready for the journey to New York.

THE MUSEUM is indebted to Mr. Walter Winans for the gift of a series of wild boar including adults and young of both sexes, collected with a view to their use in the construction of a habitat group. He has also sent us two fine specimens of the European red deer. All of these specimens were taken in the Sachsenwald, Friedrichsruhe, Germany. These specimens are the first good examples of the species that the Museum has received.

A CLUB ROOM FOR MEMBERS was opened on February 28. This room situated on the third floor near the elevators is one of the most attractive in the building and has been furnished to serve as far as may be the comfort of the Museum's patrons. A formal presentation of the portrait of the Honorable Joseph H. Choate, painted by the Princess Lwoff-Parlaghy and presented to the Museum by the artist, was made the occasion of the opening and of an informal reception. The other portraits owned by the Museum hang in this room also at present, awaiting the time when the extension of the Museum building will allow a Portrait Hall especially designed and lighted where can be told the history of the Museum as shown in its founders and benefactors.

MISS MARY LOIS KISSELL has just returned from a four months' trip to the Pima Indians of southern Arizona and brings with her a basketry collection in which are several artistic "carrying baskets" woven with dyed thread made of maguey fiber and six "medicine baskets" of Papago make. The latter are rare in collections because of the great difficulty that exists in obtaining them.

MRS. R. O. STEBBINS has recently presented to the Museum the collection made by the late Dr. R. O. Stebbins of the Arctic Club of America. The gift is largely ethnological, comprising Eskimo, Javanese, Chinese and Plains Indians material, but includes also a collection of minerals as well as specimens of mammals and invertebrates.

THE membership of the Museum for the year 1910 shows a net increase of ninety-three over that of the preceding year.

PUBLIC meetings of the New York Academy of Sciences<sup>f</sup> and its Affiliated Societies will be held at the Museum according to the usual schedule. Programmes of meetings are published in the weekly *Bulletin* of the Academy.

## LECTURE ANNOUNCEMENTS

### MEMBERS' COURSE

The following lectures illustrated by stereopticon will be given during March to Members of the Museum and persons holding complimentary tickets given them by Members.

Thursday evenings at 8:15 o'clock. Doors open at 7:45.

March 2 — MR. D. E. GRÜBL, "Tibet and the Himalayas."

Mr. Gröbl will present the history of Buddhism in Tibet and the hierarchy of the Dalai Lama. He will describe the life and ceremonies of the people and explain the significance of the recent political changes in the Dalai Lama's realm. Mr. Gröbl obtained during his travels some splendid pictures of the Himalayas and the borderlands of Tibet.

March 9 — MR. FREDERICK C. HICKS, "Glimpses of the Far East."

During a trip of about 30,000 miles, Mr. Hicks procured much interesting and instructive data on conditions in the Orient, as well as many photographs of the points visited. In his lecture he will speak of Korea, of China and its Great Wall and of the vast country traversed by the Siberian Railway.

March 16 — MR. CLAUDE N. BENNETT, "The Panama Canal — The Eighth Wonder of the World."

Mr. Bennett is the founder and manager of the Congressional Information Bureau at Washington. He has recently spent a month in the Canal Zone and made a thorough study of the Canal and the surrounding country. His lantern slides and moving pictures cover the work which has been accomplished to the present time.

March 23 — MR. DOUGLAS WILSON JOHNSON, "Physical History of the Grand Cañon District."

*Given in cooperation with the American Scenic and Historic Preservation Society*

Mr. Johnson's lecture deals with the principal events in the physical history of that portion of the Colorado plateau province lying in northern Arizona and southern Utah. Especial attention is given to the effects of the physical history upon the scenery of the district. Most of Mr. Johnson's lantern slides are of points not commonly visited by tourists.

March 30 — MR. ROY C. ANDREWS, "From Japan to the Dutch East Indies."

In November Mr. Andrews returned from a fifteen month's absence during which, on board the United States ship *Albatross*, he visited Japan, Formosa and many of the islands of the Dutch East Indies. He will illustrate his lecture with a very complete series of lantern slides.

### PUPILS' COURSE

These lectures are open to the pupils of the public schools when accompanied by their teachers and to children of Members of the Museum on presentation of Membership tickets Mondays, Wednesdays and Fridays at 4 o'clock.

March 20 and April 17 — MR. ROY W. MINER, "Early Days in New York."

March 22 and April 19 — MR. ROY C. ANDREWS, "A Visit to the Orient."

March 24 and April 21 — DR. LOUIS HUSSAKOF, "Scenes from Pole to Pole."

March 27 and April 24 — MR. JOHN T. NICHOLS, "Natural Resources of the United States."

March 29 and April 26 — MR. WALTER GRANGER, "Famous Rivers of the World."

March 31 and April 28 — MR. HARLAN I. SMITH, "Life among Our Indians."

April 3 and May 1 — MR. ROY C. ANDREWS, "Travels and Life among the Japanese."

April 5 and May 3 — DR. LOUIS HUSSAKOF, "South American Scenes."

April 21 and May 5 — MRS. AGNES L. ROESLER, "Around the World with Children."

#### PEOPLE'S COURSE

*Given in coöperation with the City Department of Education*

Tuesday evenings at 8:15 o'clock. Doors open at 7:15.

The first four of a course of eight lectures on music by MR. DANIEL GREGORY MASON. Illustrated at the piano.

March 7 — "Edvard Grieg."

March 14 — "Antonin Dvořák."

March 21 — "Camille Saint-Saëns."

March 28 — "César Franck."

Saturday evenings at 8:15 o'clock. Doors open at 7:15.

The first four of a course of six lectures by MR. ALBERT HALE. Illustrated.

March 4 — "The East Coast of South America: Brazil, Uruguay and the Argentine Republic, from the Amazon River to the Rio de la Plata."

March 11 — "The West Coast of South America: Chili, Bolivia, Peru and Ecuador. The Andes and the Incas."

March 18 — "The Caribbean Sea: Venezuela, Colombia and Panama. The Mountain Tropics and the Isthmian Canal."

March 25 — "The Island Republics of the Gulf: Cuba, Haiti and Santo Domingo. The early Discoveries of Columbus."

#### JESUP LECTURES

*Given under the auspices of Columbia University in coöperation with the Museum*

The last five of a course of eight lectures on "Scientific Features of Modern Medicine" by FREDERIC S. LEE, PH.D., Professor of Physiology in Columbia University. These lectures are open to the public.

Wednesday evenings at 8:15 o'clock.

March 1 — "Bacteria and Their Relation to Disease."

March 8 — "The Treatment and the Prevention of Infectious Diseases."

March 15 — "The Problem of Cancer and Other Problems."

March 22 — "Features of Modern Surgery."

March 29 — "The Rôle of Experiment in Medicine. The Public and the Medical Profession."